

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 10-329762

(43)Date of publication of application : 15.12.1998

---

(51)Int.Cl. B62D 25/20  
B60R 21/02  
B62D 25/08

---

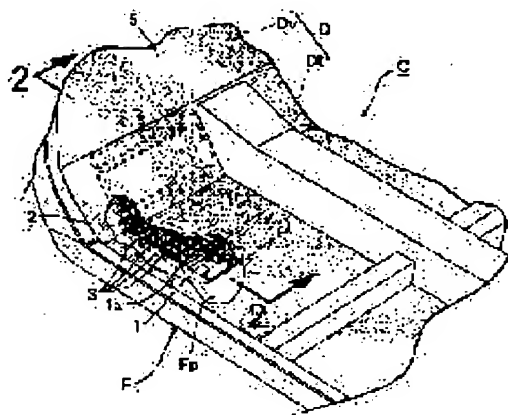
(21)Application number : 09-138913 (71)Applicant : HONDA MOTOR CO LTD  
(22)Date of filing : 28.05.1997 (72)Inventor : OKAMOTO YUTAKA  
OKUHARA HISAKAZU

---

## (54) BODY STRUCTURE FOR AUTOMOBILE

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To effectively absorb and mitigate the shock to feet at the time of a collision by forming a recess opened to the car room side at a footrest portion mounted with the feet of a front seat occupant, and providing an energy absorber for absorbing and mitigating the shock applied to the feet from a car body by the collision of an automobile on the recess.



**SOLUTION:** A toe corresponding portion below a dashboard D could be deformed protrusively backward by the retreat displacement of a front car body at the time of a collision of an automobile. An energy absorber 2 has multiple small chambers 3 and is formed with a synthetic resin integrally connected to the inner face of a recess 1. The rigidity of a car body footrest portion can be increased without sharply increasing the weight, and the deformation of the car body footrest portion can be suppressed to the

utmost by the energy absorber 2. The load burden to the feet of the occupant at the time of the collision is further reduced, the reduction of the ankle angle can be suppressed to the utmost, and the bending load applied to the ankles can be reduced.

---

## LEGAL STATUS

[Date of request for examination] 27.11.2003

[Date of sending the examiner's  
decision of rejection]

[Kind of final disposal of application  
other than the examiner's decision  
of rejection or application converted  
registration]

[Date of final disposal for  
application]

[Patent number]

[Date of registration]

[Number of appeal against  
examiner's decision of rejection]

[Date of requesting appeal against  
examiner's decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2003 Japan Patent Office

## \* NOTICES \*

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

## CLAIMS

---

[Claim(s)]

[Claim 1] The car body structure of an automobile which forms the crevice (1) which carried out opening at the vehicle room (C) side at a part for guide-peg Motobe on which the front seat crew of a car body (F) puts a guide peg, and is characterized by preparing the energy absorption object (2) for carrying out absorption relaxation of the impact which joins a guide peg from a car body (F) by the collision of an automobile in the crevice (1).

[Claim 2] Said energy absorption object (2) is a car body structure of an automobile according to claim 1 characterized by consisting of synthetic-resin material which has two or more areole (3) and is combined with said crevice (1) inside in one.

[Claim 3] The car body structure of an automobile characterized by constituting a part of the top face [ at least ] from a punching metal (7) which has many stomata (7a) by making into duplex panel structure (W) a part for guide-peg Motobe on which the front seat crew of a car body (F) puts a guide peg.

---

[Translation done.]

## \* NOTICES \*

JPO and NCIP are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

## DETAILED DESCRIPTION

---

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the car body structure in an automobile, especially the car body structure near front seat crew's step.

[0002]

[Description of the Prior Art] In the automobile, the whole surface is floor carpeted or putting a floor mat on a part for guide-peg Motobe on which the front seat crew of a car body puts a guide peg (namely, the inclination part called the toeboard of the dashboard lower part and floor panel anterior part which stands in a row in this) is known more widely than before.

[0003]

[Problem(s) to be Solved by the Invention] the case where the big impacting vehicle force from the front act on a car body by collision of an automobile -- deformation of an anterior part car body ( for example , side frame ) and retreat -- it be base on a variation rate and the dashboard lower part and the floor panel front end section deform , and although an impact may join crew guide peg carried a guide peg there , this impact can be once ease by the buffer action of said comparatively flexible floor carpet or a floor mat .

[0004] By the way, although it is possible to prepare thick pad material in a car body step part in order to fully ease the above-mentioned impact and to mitigate the burden of the guide peg of the crew at the time of a collision, in this case, thick pad material projects not a little to a vehicle

room side, and there is un-arrange [ which narrows step space so much ].  
[0005] This invention aims at offering the car body of an automobile which carries out absorption relaxation of the impact to the guide peg at the time of a collision effectively, and enabled it to mitigate the burden of a guide peg, being proposed in view of this situation and avoiding said un-arranging.

[0006]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, invention of claim 1 forms the crevice which carried out opening at the vehicle room side at a part for guide-peg Motobe on which the front seat crew of a car body puts a guide peg, and is characterized by preparing the energy absorption object for carrying out absorption relaxation of the impact which joins a guide peg from a car body by the collision of an automobile in the crevice. according to this description -- the time of the collision of an automobile -- rapid deformation of an anterior part car body ( for example , side frame ) and retreat -- it be base on a variation rate , and since absorption relaxation of that impact ( a load , rate of deformation ) be carry out with an energy absorption object even if an impact act on the car body step part on which front seat crew put a guide peg , the burden of a guide peg be mitigate so much . And since it is suppressed by having prepared the above-mentioned energy absorption object in the crevice of a car-body step part that an energy absorption object \*\*\*\*s to a vehicle room side in the state of anticipated use, reduction of the step space by special establishment of this absorber is suppressed.

[0007] moreover -- especially -- invention of claim 2 -- the description of invention of claim 1 -- in addition, said energy absorption object being characterized by consisting of synthetic-resin material which has two or more areole and is combined with said crevice inside in one, and according to this description It is raised without the rigidity of the car-body step part on which front seat crew puts a guide peg causing the increase of large weight, and deformation of a car-body step part is suppressed as much as possible.

[0008] Furthermore, invention of claim 3 is characterized by constituting a part of that top face [ at least ] from a punching metal which has many stomata by making into duplex panel structure a part for guide-peg Motobe on which the front seat crew of a car body puts a guide peg, and

according to this description Since impact absorptivity ability is demonstrated in the punching metal section while rigid improvement in a car-body step part whose front seat crew puts a guide peg is achieved, even if said impact acts on a car-body step part at the time of the collision of an automobile, deformation of a car-body step part is suppressed effectively, carrying out absorption relaxation of the impact. [0009]

[Embodiment of the Invention] The gestalt of operation of this invention is concretely explained below based on the example of this invention illustrated to the accompanying drawing.

[0010] In an accompanying drawing, drawing 1 – drawing 3 show the 1st example of this invention, and especially drawing 1 is the same sectional view as drawing 2 of a vehicle room passenger side step an abbreviation perspective view and drawing 2 indicate the 2-2 line view sectional view of drawing 1 , and drawing 3 indicates the deformation condition at the time of a car collision to be in part. Moreover, drawing 4 – drawing 6 show the 2nd example of this invention, and especially drawing 4 is the same sectional view as drawing 5 of a vehicle room passenger side step an abbreviation perspective view and drawing 5 indicate the 5-5 line view sectional view of drawing 4 , and drawing 6 indicates the deformation condition at the time of a car collision to be in part.

[0011] First, in drawing 1 and drawing 2 which show the 1st example, the car body F of Automobile V has monocoque structure by the welding assembly of a steel plate panel, and the car body F by the side of a front [ room / C / vehicle ] has in one the side frame S of a Uichi Hidari pair respectively prolonged in a cross direction in the right-and-left both-sides section. The side frame S of these right and left is respectively formed in closed section structure, and is making the frame of an anterior part car body, and joint support of the right-and-left both-sides section of the subframe for engine support (not shown) is carried out by two or more places between both that side frame S.

[0012] Moreover, it is arranged in general at the vertical so that the dashboard D which constitutes the front end wall of the nothing vehicle room C for a part of car body F may divide the vehicle room C and an engine room. The lower part of the dashboard D inclines to fall the back, the toeboard section Dt corresponding to front seat crew's guide peg is constituted, and the lower limit edge is combined with the front end

section of the floor panel Fp of a car body F in one. the front face of the lower limit approach of Dashboard D -- each back end section of the side frame S of said right and left -- the abbreviation for this board D -- ranging over the perpendicular vertical section Dv and the inclined lower limit section (toeboard section Dt), spacing is set mutually and it is combined with it in one. The above is a conventionally ordinary car body structure.

[0013] Moreover , ranging over the toeboard section Dt of Dashboard D , and the floor panel Fp front end section , the shallow crevice 1 of the shape of a rectangle which carried out opening to the vehicle room side be form in a part for guide peg Motobe on which the front seat crew of a car body F put a guide peg , and receipt installation of the energy absorption object 2 for carry out absorption relaxation of the impact which join a guide peg from a car body F by collision of an automobile be carry out in a passenger side in the crevice 1 . This energy absorption object 2 consists of synthetic-resin Plastic solids which have two or more areole 3 and are combined with said crevice 1 inside in one. As such a synthetic-resin Plastic solid, the polypropylene box-manufacturing object of the parallel-crosses structure which unified both the walls of a large number located in a line in the shape of a grid in all directions (therefore, the small space of a large number formed in both those walls is equivalent to said areole 3) is selected by this example.

[0014] corresponding to be crook in the shape of \*\*\*\* , crookedness formation of said energy absorption object 2 be similarly carry out at the shape of \*\*\*\* so that said crevice 1 of a car body step part may meet the toeboard section Dt and the floor panel Fp , the first portion top face where this energy absorption object 2 inclined be make into the toeboard side which crew sole be make to face , and a section top face be make into heel \*\*\*\*\* which carry crew heel 6 that level second half . In addition, the energy absorption object 2 may fabricate the whole to one, and may divide and fabricate it to two or more components (it is a part a part for the first portion corresponding to the toeboard section Dt, and the second half corresponding to the floor panel Fp).

[0015] Two or more attachment boss 1a which upheaves to a vehicle room side and crosses this crevice 1 in the base of said crevice 1 sets spacing mutually, and is formed in one, and concave 2a is formed in the inferior surface of tongue of said energy absorption object 2 corresponding

to these boss 1a. and -- if in charge of anchoring of the energy absorption object 2 -- said boss 1a -- concave 2a -- inserting in -- the inferior surface of tongue of this absorber 2 -- crevice 1 base -- coupling means, such as adhesion, -- with, it joins together. Thus, by making concave 2a engage with boss 1a, cross-direction relative displacement to crevice 1 base of the energy absorption object 2 is regulated effectively, and can raise the attachment reinforcement of this absorber 2.

[0016] The whole surface is covered with the floor carpet 5, therefore the top face of said energy absorption object 2 is also covered with the rear face of Dashboard D, and the top face of the floor panel Fp with this floor carpet 5.

[0017] Next, an operation of said example is explained. In the state of the anticipated use of Automobile V, since the energy absorption object 2 is held in the crevice 1 of a car-body step part and it does not project to the vehicle room C side, even if it establishes this absorber 2 specially, front seat crew's step space does not decrease, namely, the same step space as the usual automobile is secured.

[0018] moreover , deformation with an anterior part car body ( for example , the side frame S ) rapid at the time of a collision of an automobile and retreat -- it be base on a variation rate , and although an impact may act on the car body step part on which front seat crew put a guide peg , since absorption relaxation of the impact be effectively carry out with the energy absorption object 2 locate in this car body step part , the burden of a guide peg be mitigate so much .

[0019] moreover, the time of the collision of this automobile -- retreat of an anterior part car body (for example, the side frame S) -- in connection with a variation rate etc., it is shown in drawing 3 -- as -- the tip of a foot of the dashboard D lower part -- it may deform so that a corresponding point may push out back In this case, since the energy absorption object 2 consists of synthetic-resin material which has two or more areole 3 and is combined with the inside of a crevice 1 in one, and the rigidity of a car-body step part can be raised, without being accompanied by the increase of large weight, Deformation of a car-body step part can be suppressed as much as possible with this absorber 2, thereby, the load burden of the guide peg of the crew at the time of a collision is mitigated further, and the bending load by which reduction of the ankle include angle (a leg part and a tip of a foot include angle with the section to make) can also be



suppressed as much as possible, and joins an ankle further is mitigated.

[0020] Moreover, the 2nd example of this invention is shown in drawing 4 – drawing 6 . In this example, a part for guide-peg Motobe on which the front seat crew of a car body F puts a guide peg is made into the duplex panel structure W ranging over the floor panel Fp front end section which stands in a row in the toeboard section Dt of Dashboard D, and this, and a part of top face [ at least ] of that duplex panel structured division consists of punching metals 7 (namely, porous metal plate) which have much stoma 7a.

[0021] That is, in a part for this duplex panel structured division, the rectangle-like opening 8 is formed in the car-body step part Dt, i.e., the toeboard section, and the floor panel Fp front end section, and flat dished ROAPANERU 9 made from a metal plate which plugs up that opening 8 from the bottom, and the punching metal 7 which plugs up this opening 8 from the bottom are combined with welding etc. by the edge of that opening 8 in one by the coupling means. Said ROAPANERU 9 is formed in dished [ which swelled to the vehicle room C and the opposite side ], and it is crooked in the shape of V character so that the toeboard section Dt and the floor panel Fp may moreover be met.

[0022] The car-body step part on which it \*\*, and front seat crew puts a guide peg according to this 2nd example Since impact absorptivity ability is demonstrated in the punching metal section 7 of the top face while rigidity is raised by having made this into the duplex panel structure W Even if it can expect the same operation effectiveness as the 1st example, namely, said impact acts on a car-body step part at the time of the collision of an automobile, deformation of a car-body step part is suppressed effectively, carrying out absorption relaxation of the impact. In addition, especially in this example, by making that top face (punching metal 7) into a flat for a car-body step part also as duplex panel structure W, and having swollen the inferior surface of tongue (ROAPANERU 9) to the down side, it is suppressed that a car-body step part \*\*\*\*s to a vehicle room side, and reduction of step space is avoided.

[0023] As mentioned above, although the example of this invention was explained, examples various by within the limits of this invention are possible for this invention, without being limited to the example. For example, although the 1st example showed what formed the energy absorption object 2 in the car-body step part of a passenger side, in this

invention (claim 1-2), it is good also considering the car-body step part of a drivers side as same structure. Moreover, other structures made from - paper made of synthetic resin which have the same buffer function as said energy absorption object 2, for example, a product, each honeycomb structure object made from aluminum, the Plastic solid of hard urethane, the foaming object made from polypropylene, etc. are selected, and you may make it prepare it in the crevice 1 of a car-body step part.

[0024] Although the 2nd example furthermore showed what made the car-body step part of a passenger side the duplex panel structure W, in this invention (claim 3), it is good also considering the car-body step part of a drivers side as duplex panel structure.

[0025]

[Effect of the Invention] according to each invention of claim 1-2 -- the time of the collision of an automobile -- deformation of an anterior part car body (for example, side frame) and retreat -- it be base on a variation rate etc., and since it be made to carry out with the energy absorption object which prepared the impact in this car body step part absorption relaxation even if the impact acted on the car body step part on which front seat crew put a guide peg, the burden of a guide peg be so much mitigable. And by having prepared the above-mentioned energy absorption object in the crevice of a car-body step part, since it is suppressed that this absorber \*\*\*\*s to a vehicle room side, reduction of the step space by special establishment of this absorber is suppressed, and the step space can be secured widely.

[0026] Moreover, being able to raise the rigidity of a car-body step part, without being accompanied by the increase of large weight, therefore avoiding the increase of a body weight, since the above-mentioned energy absorption object consists of synthetic-resin material which has two or more areole and is combined with said crevice inside in one especially according to invention of claim 2, deformation of this car-body step part is suppressed as much as possible, and can mitigate the burden of a guide peg further.

[0027] According to invention of claim 3, a part for guide-peg Motobe on which the front seat crew of a car body puts a guide peg by furthermore, the thing considered as duplex panel structure Since the rigid improvement for this guide-peg Motobe can be raised and impact absorptivity ability was further demonstrated by making a part of the top

face [ at least ] into a punching metal Even if said impact acts on a car-body step part at the time of the collision of an automobile, deformation of a car-body step part can be suppressed effectively, carrying out absorption relaxation of the impact effectively, therefore the burden of a guide peg can be mitigated further.

---

[Translation done.]

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開平10-329762

(43) 公開日 平成10年(1998)12月15日

(51) Int.Cl.<sup>6</sup>

識別記号

F I

B 6 2 D 25/20

B 6 2 D 25/20

D

G

B 6 0 R 21/02

B 6 0 R 21/02

M

B 6 2 D 25/08

B 6 2 D 25/08

F

審査請求 未請求 請求項の数 3 O L (全 5 頁)

(21) 出願番号

特願平9-138913

(22) 出願日

平成9年(1997)5月28日

(71) 出願人 000005326

本田技研工業株式会社

東京都港区南青山二丁目1番1号

(72) 発明者 岡本 豊

埼玉県和光市中央1丁目4番1号 株式会

社本田技術研究所内

(72) 発明者 奥原 久和

埼玉県和光市中央1丁目4番1号 株式会

社本田技術研究所内

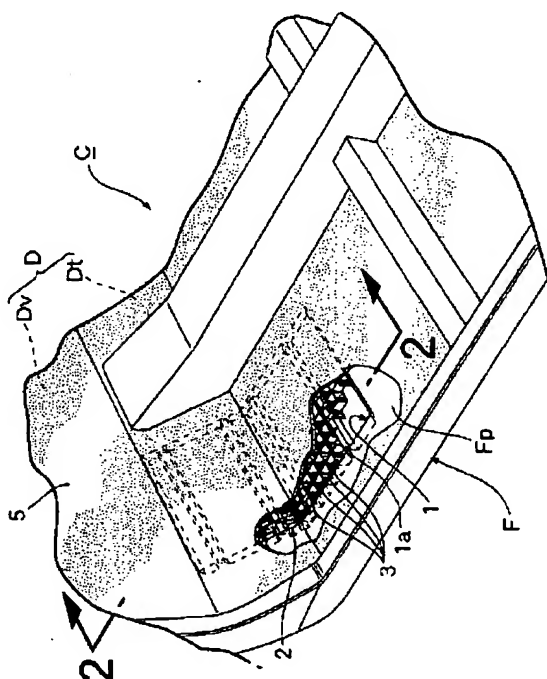
(74) 代理人 弁理士 落合 健 (外1名)

(54) 【発明の名称】 自動車の車体構造

(57) 【要約】

【課題】 自動車の衝突時に、乗員の足への衝撃を緩和して足の負担を軽減できるようにする。

【解決手段】 車体Fの、前席乗員が足を載せる足元部分に、車室C側に開口した凹部1を形成し、その凹部1に、自動車の衝突により車体から足に加わる衝撃を吸収緩和するためのエネルギー吸収体2を設ける。



## 【特許請求の範囲】

【請求項1】 車体（F）の、前席乗員が足を載せる足元部分に、車室（C）側に開口した凹部（1）を形成し、その凹部（1）に、自動車の衝突により車体（F）から足に加わる衝撃を吸収緩和するためのエネルギー吸収体（2）を設けたことを特徴とする、自動車の車体構造。

【請求項2】 前記エネルギー吸収体（2）は、複数の小室（3）を有して前記凹部（1）内面に一体的に結合される合成樹脂材より構成されることを特徴とする、請求項1に記載の自動車の車体構造。

【請求項3】 車体（F）の、前席乗員が足を載せる足元部分を二重パネル構造（W）として、その上面の少なくとも一部を、多数の小孔（7a）を有するパンチメタル（7）より構成したことを特徴とする、自動車の車体構造。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、自動車における車体構造、特に前席乗員の足元付近の車体構造に関するものである。

## 【0002】

【従来の技術】自動車において、車体の、前席乗員が足を載せる足元部分（即ちダッシュボード下部のトーボードと呼ばれる傾斜部分や、これに連なるフロアパネル前部）にフロアカーペットを一面に敷いたり或いはフロアマットを置くことは、従来より広く知られている。

## 【0003】

【発明が解決しようとする課題】自動車の衝突により車体に前方からの大きな衝突荷重が作用した場合には、前部車体（例えばサイドフレーム）の変形や後退変位に因りダッシュボード下部やフロアパネル前端部が変形して、そこに載せた乗員の足に衝撃が加わることがあるが、この衝撃は、比較的柔軟な前記フロアカーペットやフロアマットの緩衝作用により一応緩和できるようなっている。

【0004】ところで上記衝撃を十分に緩和して衝突時における乗員の足の負担を軽減するために、例えば車体足元部分に厚いパッド材を設けることが考えられるが、この場合には、厚いパッド材が車室側に少なからず突き出して、それだけ足元空間を狭くする不都合がある。

【0005】本発明は、斯かる事情に鑑み提案されたものであって、前記不都合を回避しながら、衝突時における足への衝撃を効果的に吸収緩和して足の負担を軽減できるようにした、自動車の車体を提供することを目的とする。

## 【0006】

【課題を解決するための手段】上記目的を達成するために、請求項1の発明は、車体の、前席乗員が足を載せる足元部分に、車室側に開口した凹部を形成し、その凹部

に、自動車の衝突により車体から足に加わる衝撃を吸収緩和するためのエネルギー吸収体を設けたことを特徴としている。この特徴によれば、自動車の衝突時に前部車体（例えばサイドフレーム）の急激な変形や後退変位に因り、前席乗員が足を載せる車体足元部分に衝撃が作用しても、その衝撃（荷重、変形の数値）がエネルギー吸収体により吸収緩和されるから、それだけ足の負担が軽減される。しかも上記エネルギー吸収体を車体足元部分の凹部に設けたことで、通常の使用状態でエネルギー吸収体が車室側に張出すことが抑えられるから、該吸収体の特設による足元空間の減少が抑えられる。

【0007】また特に請求項2の発明は、請求項1の発明の特徴に加えて、前記エネルギー吸収体が、複数の小室を有して前記凹部内面に一体的に結合される合成樹脂材より構成されることを特徴としており、この特徴によれば、前席乗員が足を載せる車体足元部分の剛性が、大幅な重量増を来すことなく高められて、車体足元部分の変形が極力抑えられる。

【0008】更に請求項3の発明は、車体の、前席乗員が足を載せる足元部分を二重パネル構造として、その上面の少なくとも一部を、多数の小孔を有するパンチメタルより構成したことを特徴としており、この特徴によれば、前席乗員が足を載せる車体足元部分の剛性向上が図られると共にパンチメタル部において衝撃吸収性能が発揮されるから、自動車の衝突時に車体足元部分に前記衝撃が作用しても、その衝撃を吸収緩和しつつ車体足元部分の変形が効果的に抑えられる。

## 【0009】

【発明の実施の形態】本発明の実施の形態を、添付図面に例示した本発明の実施例に基づいて以下に具体的に説明する。

【0010】添付図面において、図1～図3は、本発明の第1実施例を示すもので、特に図1は車室助手席側足元の一部省略斜視図、図2は図1の2-2線矢視断面図、図3は車両衝突時の変形状態を示す、図2と同様の断面図である。また図4～図6は本発明の第2実施例を示すもので、特に図4は車室助手席側足元の一部省略斜視図、図5は図4の5-5線矢視断面図、図6は車両衝突時の変形状態を示す、図5と同様の断面図である。

【0011】先ず、第1実施例を示す図1、図2において自動車Vの車体Fは、鋼板パネルの溶接組立によるモノコック構造になっており、車室Cより前側の車体Fは、その左右両側部において前後方向に各々延びる左右一対のサイドフレームSを一体に有している。この左右のサイドフレームSは、各々閉断面構造に形成されて前部車体の骨格をなしており、またその両サイドフレームS間には、エンジン支持用のサブフレーム（図示せず）の左右両側部が複数箇所て結合支持される。

【0012】また車体Fの一部をなし車室Cの前端壁を構成するダッシュボードDが、車室Cとエンジンルーム

とを区画するように概ね鉛直に配置されている。そのダッシュボードDの下部は後下がり傾斜して、前席乗員の足に対応するトーボード部Dtを構成しており、その下端縁は、車体FのフロアパネルFpの前端部と一体的に結合されている。ダッシュボードDの下端寄りの前面には、前記左右のサイドフレームSの各後端部が該ボードDの略鉛直な鉛直部Dvと傾斜した下端部（トーボード部Dt）とに跨がって、且つ相互に間隔をおいて一体的に結合される。以上は、従来普通の車体構造である。

【0013】また助手席側においては、車体Fの、前席乗員が足を載せる足元部分には、ダッシュボードDのトーボード部DtとフロアパネルFp前端部とに跨がって、車室側に開口した方形の浅い凹部1が形成されており、その凹部1には、自動車の衝突により車体Fから足に加わる衝撃を吸収緩和するためのエネルギー吸収体2が収納設置される。このエネルギー吸収体2は、複数の小室3を有して前記凹部1内面に一体的に結合される合成樹脂成形体より構成される。このような合成樹脂成形体として、本実施例では、縦横に格子状に並ぶ多数の壁体相互を一体化（従ってそれらの壁体相互に形成される多数の小空間が前記小室3に相当）した井桁構造のポリプロピレン製箱体が選定される。

【0014】前記エネルギー吸収体2は、車体足元部分の前記凹部1がトーボード部DtとフロアパネルFpとに沿うように字状に屈曲しているのに対応して、同様に字状に屈曲形成されており、このエネルギー吸収体2の傾斜した前半部上面は、乗員の足裏を臨ませるトーボード面とされ、またその水平な後半部上面は、乗員の踵部6を載せるヒール載せ面とされる。尚、エネルギー吸収体2は、その全体を一体に成形してもよく、また複数の構成要素（例えばトーボード部Dtに対応する前半部分と、フロアパネルFpに対応する後半部分）に分割して成形してもよい。

【0015】前記凹部1の底面には、車室側に隆起して該凹部1を横切る複数の取付ボス1aが相互に間隔をおいて一体に形成されており、これらボス1aに対応して前記エネルギー吸収体2の下面には凹溝2aが形成される。そしてエネルギー吸収体2の取付けに当たっては、前記ボス1aに凹溝2aを嵌め込み、該吸収体2の下面を凹部1底面に接着等の結合手段を以て結合する。このようにボス1aに凹溝2aに係合させることによって、エネルギー吸収体2の凹部1底面に対する前後方向相対移動が効果的に規制され、該吸収体2の取付強度を高めることができる。

【0016】ダッシュボードDの後面およびフロアパネルFpの上面には、フロアカーペット5が一面に敷き詰められており、従って前記エネルギー吸収体2の上面もこのフロアカーペット5により覆われる。

【0017】次に前記実施例の作用を説明する。自動車

Vの通常の使用状態で、エネルギー吸収体2は車体足元部分の凹部1に收容されていて車室C側に突き出すことはないから、該吸収体2を特設しても前席乗員の足元空間が減ぜられることはなく、即ち通常の自動車と同様の足元空間が確保される。

【0018】また自動車の衝突時には、前部車体（例えばサイドフレームS）の急激な変形や後退変位に因り、前席乗員が足を乗せる車体足元部分に衝撃が作用することがあるが、その衝撃は、該車体足元部分に位置するエネルギー吸収体2により効果的に吸収緩和されるため、それだけ足の負担が軽減される。

【0019】またこの自動車の衝突の際に前部車体（例えばサイドフレームS）の後退変位等に伴い、図3に示すようにダッシュボードD下部の足先対応部分が後方へ迫り出すように変形する場合がある。この場合、エネルギー吸収体2は、複数の小室3を有して凹部1の内面に一体的に結合される合成樹脂材より構成されていて、車体足元部分の剛性を、大幅な重量増を伴うことなく高めることができるため、該吸収体2により車体足元部分の変形を極力抑えることができ、これにより、衝突時における乗員の足の荷重負担が一層軽減され、更にその足首角度（脛部と足先部とのなす角度）の減少も極力抑えることができ足首に加わる曲げ荷重が軽減される。

【0020】また図4～図6には本発明の第2実施例が示される。この実施例では、車体Fの、前席乗員が足を載せる足元部分が、ダッシュボードDのトーボード部Dtとこれに連なるフロアパネルFp前端部とに跨がって二重パネル構造Wとされ、その二重パネル構造部の上面の少なくとも一部が、多数の小孔7aを有するパンチメタル7（即ち多孔金属板）より構成されている。

【0021】即ち、この二重パネル構造部分においては、車体足元部分、即ちトーボード部Dt及びフロアパネルFp前端部には方形の開口8が形成されており、その開口8を下側から塞ぐ扁平皿状の金属板製ロアパネル9と、同開口8を上側から塞ぐパンチメタル7とがその開口8の縁部に溶接等に結合手段により一体的に結合される。前記ロアパネル9は、車室Cと反対側へ膨らんだ皿状に形成されており、しかもトーボード部DtとフロアパネルFpとに沿うようにV字状に屈曲している。

【0022】而してこの第2実施例によれば、前席乗員が足を乗せる車体足元部分は、これを二重パネル構造Wとしたことで剛性が高められると共に、その上面のパンチメタル7において衝撃吸収性能が発揮されるから、第1実施例と同様の作用効果が期待でき、即ち、自動車の衝突時に車体足元部分に前記衝撃が作用しても、その衝撃を吸収緩和しつつ車体足元部分の変形が効果的に抑えられる。尚、この実施例では、車体足元部分を二重パネル構造Wとしても、特にその上面（パンチメタル7）をフラットとし且つ下面（ロアパネル9）を下側に膨らませるようにしたことで、車体足元部分が車室側に張出

すことが抑えられ、足元空間の減少が回避される。

【0023】以上、本発明の実施例について説明したが、本発明はその実施例に限定されることなく、本発明の範囲内で種々の実施例が可能である。例えば、第1実施例では、エネルギー吸収体2を助手席側の車体足元部分に設けたものを示したが、本発明（請求項1・2）においては運転席側の車体足元部分を同様の構造としてもよい。また前記エネルギー吸収体2としては、同様の緩衝機能を有する他の構造体、例えば合成樹脂製・ペーパー製又はアルミニウム製の各ハニカム構造体、硬質ウレタン

【0024】更に第2実施例では、助手席側の車体足元部分を二重パネル構造Wとしたものを示したが、本発明（請求項3）においては、運転席側の車体足元部分を二重パネル構造としてもよい。

【0025】

【発明の効果】請求項1・2の各発明によれば、自動車の衝突時に前部車体（例えばサイドフレーム）の変形や後退変位等に因り、前席乗員が足を乗せる車体足元部分に衝撃が作用しても、その衝撃を、該車体足元部分に設けたエネルギー吸収体により吸収緩和できるようにしたので、それだけ足の負担を軽減することができる。しかも上記エネルギー吸収体を車体足元部分の凹部に設けたことで、該吸収体が車室側に張出すことが抑えられるから、該吸収体の特設による足元空間の減少が抑えられ、その足元空間を広く確保することができる。

【0026】また特に請求項2の発明によれば、上記エネルギー吸収体が、複数の小室を有して前記凹部内面に一体的に結合される合成樹脂材より構成されるので、車体足元部分の剛性を、大幅な重量増を伴うことなく向上さ\*

\* せることができ、従って車体重量増を回避しながら、該車体足元部分の変形が極力抑えられて足の負担を一層軽減することができる。

【0027】更に請求項3の発明によれば、車体の、前席乗員が足を載せる足元部分を二重パネル構造としたことで、該足元部分の剛性向上を高めることができ、更にその上面の少なくとも一部をパンチメタルとして衝撃吸収性能が発揮されるようにしたので、自動車の衝突時に車体足元部分に前記衝撃が作用しても、その衝撃を効果的に吸収緩和しつつ車体足元部分の変形を効果的に抑えることができ、従って足の負担を一層軽減することができる。

【図面の簡単な説明】

【図1】本発明の第1実施例を示す車室助手席側足元の一部省略斜視図

【図2】図1の2-2線矢視断面図

【図3】車両衝突時の変形状態を示す、図2と同様の断面図

【図4】本発明の第2実施例を示す車室助手席側足元の一部省略斜視図

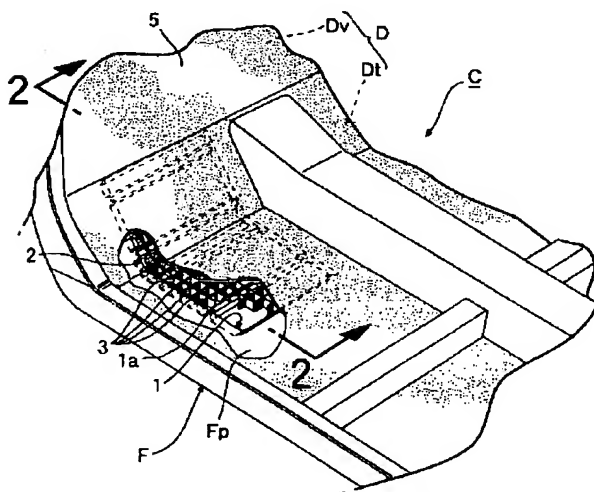
【図5】図4の5-5線矢視断面図

【図6】車両衝突時の変形状態を示す、図5と同様の断面図

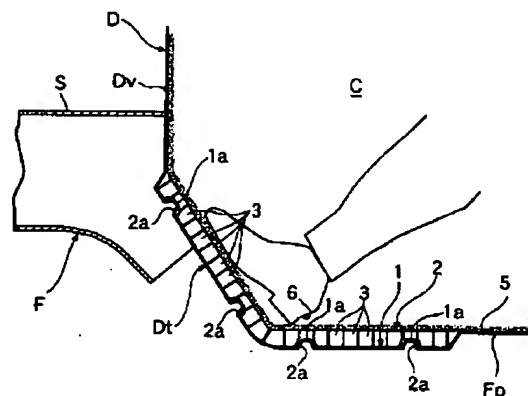
【符号の説明】

C・・・車室  
F・・・車体  
W・・・二重パネル構造  
1・・・凹部  
2・・・エネルギー吸収体  
3・・・小室  
7・・・パンチメタル

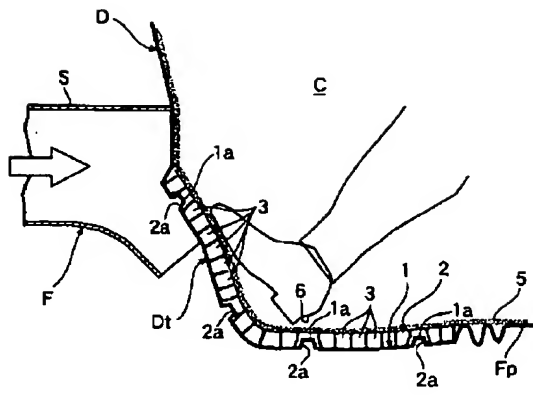
【図1】



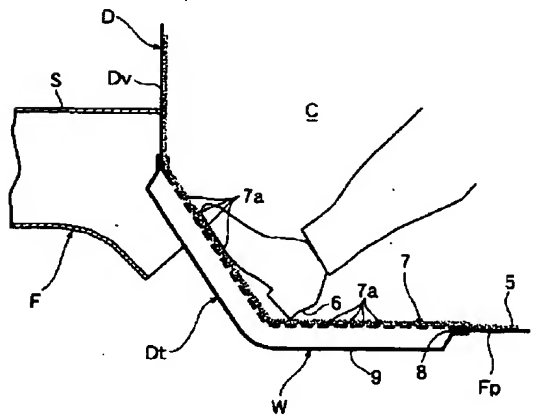
【図2】



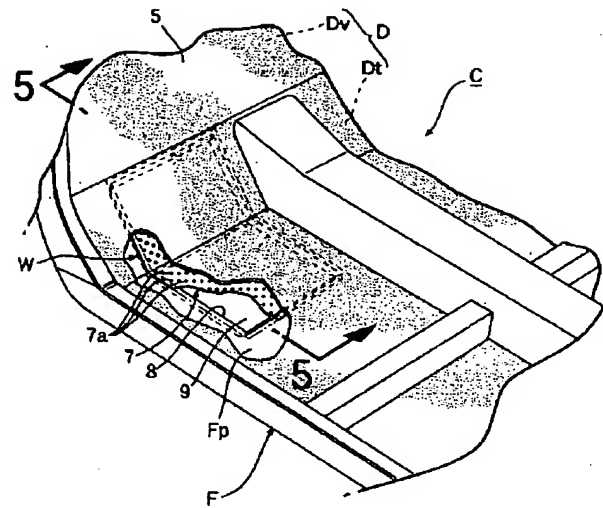
【図3】



【図5】



【図4】



【図6】

